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MIXING OR KNEADING DEVICE

Andries Cornelis Sabelis, Haarlem, Netherlands, assignor to Nautamix Patent A.G., Zug, Switzerland

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ABSTRACT OF THE DISCLOSURE

An apparatus for mixing, stirring or kneading one or several substances, the apparatus having a column mounted for axial rotation in a vessel, at least one arm fixed at one end to the column and extending toward the side wall of the vessel, a treating member rotatably supported by the other end of the arm and extending downwardly to a bracket on the bottom of the column. A first drive means turns the column so that it, the arm and the member rotate with the column and a second drive means turns a drive shaft extending axially within the column to drive the treating member about its own axis, at least one and preferably both of the drive means being supported by a movable support mounted on the vessel.

BACKGROUND OF THE INVENTION

One form of apparatus for performing treating operations such as mixing, stirring or kneading on one or several substances employs a vessel which is essentially of inverted frusto-conical shape. The vessel has a bearing which supports a column which is coaxial with the vessel and which is rotatable about the common axis. Extending radially outwardly from the column is an arm which at its outer end engages a member which extends between the arm and a bracket positioned on the column. A first drive means is provided to rotate the assembly consisting of the column, arm and member about the column's axis. The treating member is rotated about its axis by a second drive means which rotates a shaft extending within and coaxial with a column which shaft drives another shaft extending through the arm and which drives the treating member.

In such apparatuses the bearing which supports the column, the drive means for rotating the column and the bearing for the drive shaft which drives the member about its own axis as well as the drive means for rotating the member are all mounted in a box which is rigidly connected to the vessel. Such an arrangement has several disadvantages. For one, the reaction forces generated by the column, arm, and member rotating through the substances in the vessel as well as the weight of this assembly must be supported by the drive means. Therefore, the box must be supported by a heavy structure mounted on the vessel. Structures of this kind add appreciably to the height and weight of the apparatus and are consequently undesirable.

Another disadvantage is that the transmissions through which the two drive means rotate the column and the arms are subjected to much wear. Because of the heavy duty to which the transmissions are subjected, they must be of heavy construction and consequently waste a considerable portion of the useful output of the driving motors.

SUMMARY OF THE INVENTION

The above disadvantages are overcome by providing a frusto-conical vessel with a column mounted therein for rotation about the common axis of the vessel and column. An arm extending outwardly from the column to engage

at one end a treating member which extends to a bracket on the column, a first drive means for rotating the column, arm and the treating member about the column's axis, a second drive means for driving a shaft within the column to drive the member about its own axis at least one of the drive means being mounted on a support which is movably mounted on the vessel.

BRIEF DESCRIPTION OF THE DRAWING

The figure is a side view, partly in section, showing treating apparatus made in accordance with the present invention.

DETAILED DESCRIPTION OF THE DRAWING

In the figure there is shown a mixing vessel **1** of inverted frusto-conical shape in which a vertically extending hollow column **2** is positioned so that it is coaxial with the vessel. The column **2** is rotatably supported at its lower end by a bearing **3** which is mounted in a lower or base wall **4** of the mixing vessel **1**. The bearing **3** allows the column **2** to rotate about its own axis but prevents lateral movement of the column **2** in relation to the vessel **1**. The column **2** includes a broadened portion **5** which is close to the upper end of the column **2**. The upper end of the column **2** is rotatably supported in a self-adjusting bearing positioned within a bearing block **6**, the self-adjusting bearing, which is not shown in the drawing, preventing downward movement of the column **2**. The bearing block **6** is supported by a plate **7** which is secured to the top of a side wall **8** at an annular flange **9** provided on the top thereof. The top end of the column **2** projects upwardly beyond the bearing block **6** and into a housing **10** which accommodates a drive means and a transmission for rotating the column **2** about its own axis. The transmission and drive means within the housing **10** are not novel per se, and are not shown in the drawing.

Extending outwardly from opposite sides of the broadened part **5** of the column **2** are two hollow arms **11**, each of which extends radially toward the side wall **8**. Each of the arms **11** have an outer end **12** which engages an upper end **13** of a shaft **14** of an associated mixing screw **15**. Each assembly of a shaft **14** and screw **15** constitutes a treating member and is mounted within the outer end **12** of an arm **11** by a bearing which prevent downward axial movement of the screw **15**. As shown in the drawing each mixing screw **15** extends adjacent to, and parallel with, the side wall **8** and is inclined with respect to the column **2**. The lower end of each of the shafts **14** is rotatably supported on a pin **16** which is mounted on a bracket **17** fixed to the column **2** at a location adjacent to the lower end of the column **2**. With this arrangement the shaft **14** can slide axially with respect to the bracket **17** but cannot move radially with respect to the column **2**. The brackets **17** are arranged diametrically opposite to each other and in the same vertical plan as the arms **11** so that when the assembly consisting of the column **2**, arms **11**, screw **15** and bracket **17** rotates, the shafts **14** of the mixing screw **15** are moved smoothly by the column **2**.

Extending longitudinally in each hollow arm **11** is a shaft **18** which extends to the associated outer end **12** of the arm **11**. A bevel gear **19** is fixed to the inner end of each shaft **18** within the broadened part **5** of the column **2**. The two bevel gears **19** mesh with a bevel gear **20** which is perpendicular to both of the gear wheels **19** and which is fixed on the lower end of a driving shaft **21** which extends upwardly through the column **2** to a height beyond the upper end of the column **2**. The shaft **21**, which is rotatably mounted in the column **2** extends upwardly into a housing **22**. Within the housing **22** are drive means for rotating the shaft **21** about its own axis. The housing **22**